

Claims

1. A clutching device comprising:

a generally cylindrical tubular slipper having a friction surface and a bearing surface with an axial slit extending between the friction surface and a bearing surface, the bearing surface having radial projections which form axially oriented recesses, the tubular
5 slipper including a first interlocking member; and

a generally cylindrical coupling member having a mounting surface and a bearing surface, the bearing surface having radial projections which form axially oriented recesses such that the tubular slipper recesses and the coupling member recesses form pockets in
10 which said rollers are located, the coupling member including a second interlocking member,

wherein the tubular slipper and coupling member are axially displaceable relative to one another such that in a first position the first and second interlocking members are engaged such that the coupling member recesses and the tubular slipper recesses are
15 maintained in circumferential alignment, and in a second position the first and second interlocking members are disengaged such that the coupling member and the tubular slipper are free to rotate relative to one another whereby the coupling member recesses and the tubular slipper recesses are circumferentially misalignable.

20 2. The device according to claim 1 wherein the first interlocking member is defined on a first radial flange extending from the tubular slipper and the second interlocking member is defined on a first radial flange extending from the coupling member.

25 3. The device according to claim 2 wherein in the first position, the tubular slipper first radial flange is axially aligned with the coupling member first radial flange.

4. The device according to claim 3 wherein the tubular slipper has a second radial flange spaced from the tubular slipper first flange and the clutching member has a second radial flange spaced from the coupling member first flange with the rollers
5 positioned between the tubular slipper first and second flanges and between the coupling member first and second flanges, and wherein an axially acting spring is positioned between the rollers and the tubular slipper and coupling member second flanges such that the spring biases the tubular slipper and coupling member first flanges in to axial alignment.

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5. The device according to claim 4 wherein the tubular slipper has an axial length greater than an axial length of the coupling member and a spacer is positioned between the tubular slipper second flange and the spring.

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6. The device according to claim 2 wherein the first and second interlocking members are defined by a series of internal and external involute splines formed on the tubular slipper and coupling member first flanges.

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7. The device according to claim 1 wherein in the second position, the coupling member rotates at a different speed than the tubular slipper thereby causing the rollers to move against the projections such that the tubular slipper is contracted.

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8. The device according to claim 1 wherein in the second position, the coupling member rotates at a different speed than the tubular slipper thereby causing the rollers to move against the projections such that the tubular slipper is expanded.

9. The device according to claim 1 wherein the coupling member is displaced relative to the tubular slipper by a shift fork.

10. The device according to claim 1 wherein the tubular slipper is mounted about a shaft and the coupling member is fixed to a first gear rotatable about the shaft.

11. The device according to claim 1 wherein the coupling member is fixed to a shaft and the tubular slipper is engaged by a first gear rotatable about the shaft.

12. A clutching device for coupling a first gear to a shaft, the clutching device comprising:

a generally cylindrical tubular slipper having a friction surface and a bearing surface with an axial slit extending between the friction surface and a bearing surface, the friction surface engaging either the shaft or the first gear and the bearing surface having radial projections which form axially oriented recesses, the tubular slipper including a first interlocking member; and

a generally cylindrical coupling member having a mounting surface and a bearing surface, the mounting surface fixed to the other of the shaft or the first gear and the bearing surface having radial projections which form axially oriented recesses such that the tubular slipper recesses and the coupling member recesses form pockets in which said rollers are located, the coupling member including a second interlocking member,

wherein the tubular slipper and coupling member are axially displaceable relative to one another such that in a first position the first and second interlocking members are engaged such that the coupling member recesses and the tubular slipper recesses are maintained in circumferential alignment, and in a second position the first and second interlocking members are disengaged such that the coupling member and the tubular

slipper are free to rotate relative to one another whereby the coupling member recesses and the tubular slipper recesses are circumferentially misalignable.

13. The device according to claim 12 wherein the first interlocking member is defined on a first radial flange extending from the tubular slipper and the second interlocking member is defined on a first radial flange extending from the coupling member.

14. The device according to claim 13 wherein in the first position, the tubular slipper first radial flange is axially aligned with the coupling member first radial flange.

15. The device according to claim 14 wherein the tubular slipper has a second radial flange spaced from the tubular slipper first flange and the clutching member has a second radial flange spaced from the coupling member first flange with the rollers positioned between the tubular slipper first and second flanges and between the coupling member first and second flanges, and wherein an axially acting spring is positioned between the rollers and the tubular slipper and coupling member second flanges such that the spring biases the tubular slipper and coupling member first flanges in to axial alignment.

16. The device according to claim 15 wherein the tubular slipper has an axial length greater than an axial length of the coupling member and a spacer is positioned between the tubular slipper second flange and the spring.

17. The device according to claim 13 wherein the first and second interlocking members are defined by a series of internal and external involute splines formed on the tubular slipper and coupling member first flanges.

5 18. The device according to claim 12 wherein the tubular slipper is positioned about the shaft and when in the second position, the coupling member rotates at a different speed than the tubular slipper thereby causing the rollers to move against the projections such that the tubular slipper is contracted against the shaft.

10 19. The device according to claim 12 wherein the tubular slipper is engaged with the first gear and when in the second position, the coupling member rotates at a different speed than the tubular slipper thereby causing the rollers to move against the projections such that the tubular slipper is expanded in to locked engagement with the first gear.

15 20. The device according to claim 12 wherein the coupling member is displaced relative to the tubular slipper by a shift fork.

20 21. The device according to claim 20 further including a second gear positioned about the shaft with a second clutching device, including a second tubular slipper and a second coupling member, therebetween and wherein the shift fork is moveable between a first position wherein neither the first or second gear is engaged, a second position wherein the first gear is engaged and a third position wherein the second gear is engaged.

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22. The device according to claim 12 wherein the tubular slipper is mounted about the shaft and the coupling member is fixed to the first gear.

23. The device according to claim 12 wherein the coupling member is fixed to
5 the shaft and the tubular slipper is engaged by the first gear.